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# The Role of Perceived Control in the Process of Older Peoples' Recovery of Physical Functions After Fall-Related Injuries: A Prospective Study

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**This study examined the predictive role of perceived control in recovery of physical functions after fall-related injuries in a cohort of 165 older people who had completed preinjury baseline assessments including physical functioning and perceived control. Follow-up assessments of functioning were made at 8 weeks, 5 months, and 12 months. Indicators for perceived control were mastery and self-efficacy expectations. Physical functioning referred to self-reported difficulties with activities of daily living. Covariates included age, gender, level of education, preinjury health status, preinjury levels of social support and disability, and, additionally, the severity of the injury. Separate regression equations were estimated with disability as outcome at 8 weeks, 5 months, and 12 months post injury. Although significant at 8 weeks and borderline significant at 5 months post injury, the predictive role of perceived control appeared to be comparatively small. Preinjury levels of disability were highly predictive for disability at 8 weeks, 5 months, and 12 months post injury. The severity of the injury is the predominant contributor to disability in the short term but becomes insignificant over time, whereas the influence of age on recovery becomes important after 5 months.**

**D**ECLINE of physical functions after fall-related injuries is a serious and common health problem in older populations (Stalenhoef, Crebolder, Knottnerus, & Van der Horst, 1997). Unsatisfactory or poor recovery may result in temporary, or even lasting, dependence and consequently threaten peoples' quality of life (Tinetti & Williams, 1998). Apart from the severity of the damage and the adequacy of the treatment, psychological resources may influence the extent to which injured people recapture their preinjury abilities for carrying out activities of everyday life. The role of psychological attributes in older peoples' psychological and physical functioning has lately become a subject of interest in studies on aging and on health-related quality of life (Kempen, Van Sonderen, & Ormel, 1999; Mendes de Leon, Seeman, Baker, Richardson, & Tinetti, 1996; Ormel et al., 1997; Welch & West, 1995), specifically attributes related to a person's sense of control over his or her environment and resources to deal with stressful changes in the personal situation. Personal resources are supposed to modify the negative effects of strains or stressors associated with advancing age, such as the following: personal loss, loss of social roles, and decline of health status. This notion is derived from Folkman and Lazarus's stress coping paradigm (Lazarus & Folkman, 1984). In that context, perceptions of control can be considered as resources for successful adaptation to lifetime challenges and can therefore be considered part of the coping process (Femia, Zarit, & Johansson, 1997; Rodin, 1987). Perceptions of control are dimensions of self-concept,

tapping on what people are or think they are, whereas coping refers to what people do, that is, which strategies they use in specific circumstances (Pearlin & Schooler, 1978).

With respect to health changes, several studies have emphasized the importance of individual differences in perceived control to health outcomes after confrontation with health-related stressors. Apparently, people who can rely on higher levels of control are also better adapted to coping with health problems, both emotionally and in practice. This may lead to better preventive and compliance behavior (O'Leary, 1985; Seeman & Seeman, 1983), quicker recovery from illnesses or injuries (Schwalbe & Gecas, 1988) and lower depression scores (Turner & Wood, 1985).

Central concepts in studies regarding perceived control and health are mastery and self-efficacy expectations. *Mastery* is a comprehensive concept of control and refers to the extent to which one assumes oneself as having control over one's life chances, unlike the fatalistic assumption that one's life is ruled by external factors (Pearlin & Schooler, 1978). A sense of mastery over one's environment may help individuals to remain resilient in the face of adverse events (Schieman & Turner, 1998). *Self-efficacy*—or self-efficacy expectations—is a related concept but differs in content. Based on Bandura's (1977) social cognitive theory, it refers to the belief that one can successfully behave as intended. Self-efficacy expectations are to be differentiated from outcome expectations, because individuals can believe that a particular type of behavior will produce a certain outcome

but they may nevertheless doubt whether they can take the necessary action (Bandura, 1977; Welch & West, 1995).

Several studies examined the relation between either mastery or self-efficacy and (decline of) physical functioning in older people, both cross-sectional and longitudinal. Mastery appeared to be a significant predictor for stability in mobility over a 4-year period in a study of Femia and colleagues (1997). Kempen and colleagues found an association between both mastery and general self-efficacy expectations and physical functioning (Kempen, Steverink, Ormel, & Deeg, 1996) in a cross-sectional study and significant unique contributions of baseline mastery to changes in physical functioning in a longitudinal study (Kempen et al., 1999).

Other studies that assessed relations between self-efficacy and (decline of) physical functioning used domain-specific instruments, according to the view of Bandura (1977). Various indicators were used, such as physical self-efficacy (Boscher, Aa, Dasler, Deeg, & Smit, 1995; Parkatti, Deeg, Boscher, & Launer, 1998), self-efficacy regarding a selection of life domains, and falls-efficacy, that is, peoples' beliefs they can perform activities of everyday life without falling (Lachman et al., 1998; Tinetti, Mendes de Leon, Doucette, & Baker, 1994). Falls-efficacy appeared to be a risk factor for functional decline (Cumming, Salkeld, Thomas, & Szonyi, 2000; Mendes de Leon et al., 1996) and also for (recurrent) falling with serious consequences (Cumming et al., 2000; Tinetti, Doucette, Claus, & Marottoli, 1995). Tennstedt, Howland, Lachman, Peterson, Kasten, and Jette (1998) evaluated an intervention to reduce fear of falling and activity restriction.

Until now, the effect of perceived control on the recovery from fall-related injuries in older people has hardly been investigated. The few studies on the subject suggest associations between perceptions of personal control and recovery in patients with hip fractures (Allegrante, MacKenzie, Robbins, & Cornell, 1991; Furstenberg, 1988) and wrist fractures (Partridge & Johnston, 1989). However, the attributes of control in these studies were assessed after the fall, and the fall and its consequences might have colored patients' perceptions.

In the present article, we examine to what extent psychological resources, such as perceived control, contribute to recovery of physical functions in a cohort of older, independently living people who sustained extremity injuries as the result of a fall. Two indicators of perceived control (i.e., mastery and self-efficacy expectations) were assessed at the baseline wave of a prospective, longitudinal study of older people's health-related quality of life. We hypothesized that persons with higher levels of perceived control would regain more of their preinjury physical abilities than persons with lower levels, up to 1 year post injury. In a previous article we demonstrated that, besides hip fractures, other fall-related injuries such as wrist and ankle fractures might lead to lasting impairments that endanger people's independence. Furthermore, the patients in the study had not generally recaptured their preinjury levels of physical functioning 1 year after the injury was sustained (Kempen, Scaf-Klomp, Ranchor, Sanderman, & Ormel, 2001; Scaf-Klomp, Van Sonderen, Sanderman, Ormel, & Kempen, 2001). This was true for all types of injuries that were studied. For this rea-

son, patients with various kinds of injuries (fractures and serious sprains or dislocations) are included in the analyses.

## METHODS

### *Sample*

The persons of this study participate in the Groningen Longitudinal Aging Study (GLAS). GLAS is a population-based prospective and longitudinal study on the determinants of health-related quality of life of older people who are living independently in the north of the Netherlands, either in the community or in sheltered accommodations. Eligible were all patients 57 years of age and older from 27 general practices linked to a local morbidity registration network (99% of the noninstitutionalized patients 57 years of age and older in the Netherlands are registered in general practices). In 1993, 5,279 people completed baseline assessments (62% of the eligible population); 4,792 were interviewed at home and completed self-report questionnaires, and 487 answered a shorter version by telephone. Participants were asked to give informed consent to be approached for follow-up studies stemming from the baseline assessment and focusing on different health problems. Objectives, design, and matters of representativeness of the GLAS were described earlier (Kempen, Jellicic, & Ormel, 1997; Ormel et al., 1998).

For this cohort study, the general practitioners (GPs) reported patients who sustained extremity injuries according to site as coded by the International Classification of Primary Care (ICPC; Lamberts, Wood, & Hofman-Okkes, 1993). Patients were included until December 31, 1997, provided that they had completed the baseline assessment. Types of injuries studied were the following: fractures of wrist/forearm (ICPC code: L72), ankle/lower leg (L73), hand/foot bones (L74), hip (L75), and "other fractures" (L76); sprains of ankle (L77), knee (L78), and "other sprains and dislocations" (L80).

The cohort study consisted of three assessments comprising semistructured interviews and self-report questionnaires administered at approximately 8 weeks, 5 months, and 12 months after the injury date. The interviews were conducted at the respondents' homes by experienced female interviewers. At the start of the interview a shortened version of Folstein's Mini-Mental State Examination (MMSE) was administered to evaluate respondents' cognitive capacities for completing the assessment (threshold score = 4; Braekhus, Laake, & Engedal, 1992; Folstein, Folstein, & McHugh, 1975).

During the inclusion period, the GPs registered 287 patients who sustained extremity injuries; patients were counted only once. Of these, 18 did not meet the inclusion criteria: a score of  $\geq 5$  on the shortened version of the MMSE ( $n = 2$ ) or enrollment in another GLAS cohort ( $n = 16$ ); 4 died in the period between registration date and date of contact and 5 people could not be located. Another 59 people refused to participate, 22 because they felt too ill and 37 for other reasons. Valid data were obtained from 201 patients participating in the first series of interviews; 186 of them also participated in the second series, and 181 in the third. Attrition after the first series was caused by refusals to continue ( $n = 9$ ), institutionalization ( $n = 1$ ), and patients' death before assessment ( $n = 2$ ); attrition of 3 people was

not well documented. Attrition after the second assessment was caused by refusal ( $n = 1$ ), poor health ( $n = 1$ ), and patients' death before assessment ( $n = 3$ ). Ten patients who participated in three follow-up assessments appeared to have completed the concise telephone interview at baseline, which did not comprise all baseline measures, and 6 patients had missing data on one or more of the predictor variables. Only those patients with complete data on the dependent variables at all four measurements were included in the analyses ( $n = 165$ , response = 63% of 260 eligible patients). Of the 121 patients not in the study (including those deceased and those who did not meet the inclusion criteria), 39 (32%) sustained hip fractures, 54 (44%) other fractures, and 29 (24%) various sprains and dislocations. So in this respect they differed significantly from the participants (proportions: 21%, 60%, and 19%, respectively). The nonparticipants were also older than the participants (mean age = 72.6 and 70.2 years, respectively) and more disabled (GARS sum scores = 27.5 and 22.8, respectively; for an explanation of GARS, see the following paragraph). Otherwise, there were no significant differences between participants and nonparticipants.

### Measures

*Physical functioning* was assessed by the Groningen Activity Restriction Scale (GARS). The GARS is a one-dimensional, hierarchical scale measuring grades of difficulties a person may experience when carrying out activities of daily living (ADLs) and instrumental activities. The scale comprises 18 items referring to activities in the domains of personal and domestic care and each item has four response categories (see Table 1) (theoretical range = 18–72). The GARS was earlier used in several studies in the Netherlands

and in a multicenter longitudinal European study on incapacitating diseases called EURIDISS. The GARS meets the stochastic cumulative scalability criteria of the Mokken model (Kempen, Miedema, Ormel, & Molenaar, 1996; Kempen & Suurmeijer, 1990) and has proven its effectiveness for measuring levels of disability in international, comparative, and longitudinal studies, both across countries and across diseases (Suurmeijer et al., 1994). Physical functioning was measured at baseline and at 8 weeks, 5 months, and 12 months post injury. The internal reliability estimate in the present study was .94 at baseline.

Two indicators of perceived control were used: mastery and general self-efficacy expectations. Both were assessed at baseline. Mastery was measured by the 7-item scale (theoretical range = 7–35), developed by Pearlin and Schooler (1978). Examples of items are, "I have little control over the things that happen to me," "There is really no way I can solve some of the problems I have," and "There is little I can do to change many of the important problems I have." General self-efficacy expectations were measured by the 16-item scale (theoretical range = 16–80) of Sherer and colleagues (1982). Examples of items are, "When I set important goals for myself I rarely achieve them," "I avoid facing difficulties," and "When trying to learn something new, I soon give up if I am not initially successful." The psychometric properties of the Dutch versions of these two instruments were successfully tested in earlier studies (Bosscher & Smit, 1998; Bosscher, Smit, & Kempen, 1997; Kempen, 1992). The internal reliability estimates for mastery and self-efficacy expectations were .78 and .84, respectively.

Preinjury health status, severity of the injury, and social support, as well as educational level, may play a role in the association of perceived control and change in physical functioning and are included as covariates in the study. As an indicator of preinjury health status, we used chronic medical morbidity as assessed at baseline. A checklist was administered, comprising 19 chronic medical conditions. Participants were asked whether they suffered from one or more of these conditions in the 12 months prior to the baseline interview. This procedure was similar to procedures used by the Netherlands Central Office of Statistics (CBS) in periodic health surveys. In order to reduce report bias, only those conditions that required a GP or specialist consult and/or prescription of medicine were counted. The number of medical conditions was used as an index. Severity of the injury was included by constructing a three-level index based on the ICPC-codes that were reported by the GPs. Hip fracture was considered the highest level, all other fractures the second level, and non-fracture injuries, such as sprains and dislocations, the lowest level. Social support interactions were measured at baseline with the 12-item Social Support List (SSL 12-I; Kempen et al., 2001; Kempen & Van Eijk, 1995). It reflects the extent of perceived support received through interactions with members of a person's primary social network. Examples of items are, "Does it ever happen to you that people . . . drop in for a pleasant visit. . . comfort you. . . reassure you. . . emphasize your strong points?" Scores on this 12-item scale range from 12 to 48; higher scores indicate more social support.

Table 1. Description of Groningen Activity Restriction Scale (GARS) Items and Response Options

Can you, fully independently . . . ?
dress yourself
get in and out of bed
stand up from sitting in a chair
wash your face and hands
wash and dry your whole body
get on and off the toilet
feed yourself
get around in the house (if necessary with a cane)
go up and down the stairs
walk outdoors (if necessary with a cane)
take care of your feet and toenails
prepare breakfast or lunch
prepare dinner
do "light" household activities (for example dusting and tidying up)
do "heavy" household activities (for example mopping, cleaning the windows, and vacuuming)
wash and iron your clothes
make the beds
do the shopping
Response options
1. Yes, I can do it fully independently without any difficulty.
2. Yes, I can do it fully independently but with some difficulty.
3. Yes, I can do it fully independently but with great difficulty.
4. No, I cannot do it independently; I can only do it with someone's help.

The internal reliability estimate in the present study was .82. Level of education was selected as an indicator for socioeconomic status. We assessed the level of education according to the International Standard Classification of Education (ISCED; Unesco, 1976). The index distinguishes six levels of education: no (elementary) school, elementary school, vocational training, high school, undergraduate degree, and graduate degree. The level of education is based on both standard formal education and vocational courses during adult life. Additionally, age and gender were included as covariates.

Physical functioning was measured at baseline and at 8 weeks, 5 months, and 12 months post injury. All other measures were measured only at baseline.

### Statistical Analysis

Descriptive statistics were computed for all variables and Pearson's (bivariate) correlation coefficients were calculated for dependent variables and covariates to be used in multiple regression analyses. Mastery and self-efficacy expectations were substantially interrelated ( $r = .55$ ), which points to a potential joint effect of both variables on recovery. We therefore conducted a factor analysis with both scores to compute a factor score, which we used as an indicator of perceived control in the regression models. The results of the factor analysis can be summarized as follows: the analysis yielded one dominant factor, which explained 77.5% of the variance, the eigenvalue was 1.6, and the internal reliability estimate was .71. Then, a series of hierarchical linear regression analyses were conducted to examine the contribution of perceived control to physical functioning at each postinjury assessment separately, controlling for the selected covariates that were all assessed at baseline only. Variables were entered in the following order: age, gender, level of education, social support, chronic medical conditions, disability at baseline, severity of the injury (Step 1), and perceived control (Step 2). Results were considered significant if  $p < .05$ .

### RESULTS

Table 2 presents the descriptive statistics of the study sample. The mean age at baseline was 70.2 years and ranged from 57 to 88 years. Far more of the participants were women (82.4%;  $N = 136$ ). Twenty percent of the patients sustained hip fractures, 60% sustained other fractures, and nearly 20% sustained nonfractures (i.e., sprains and dislocations). A detailed description of the injuries in this study sample was published previously (Scaf-Klomp et al., 2001). The GARS score at baseline was 22.8, at 8 weeks post injury 34.1, at 5 months post injury 28.5, and at 12 months post injury 28.9. At baseline, patients reported, on average, 1.3 chronic medical conditions. The interval between baseline and injury was, on average, 2 years.

The Pearson correlation coefficients between the selected variables are presented in Table 3. The univariate correlations between perceived control at baseline (factor score) and disability at either baseline, 8 weeks, 5 months, and 12 months post injury range from  $-.32$  to  $-.40$ . In addition, age, number of chronic medical conditions, and social support are significantly related to perceived control.

Table 2. Descriptive Statistics of Study Sample at Baseline in 1993 and Months Between Baseline and Injury and Type/Severity of Injury ( $N = 165$ )

Variable	<i>M</i>	<i>SD</i>	Observed Range
Age (in years)	70.2	7.8	57–88
Gender			
Women (%)	82.4		
Men (%)	17.6		
Disability			
Groningen Activity Restriction Scale (GARS) <sup>a</sup>			
At baseline	22.8	7.7	18–58
At 8 weeks	34.1	12.5	18–72
At 5 months	28.5	10.8	18–65
At 12 months	28.9	12.0	18–68
Education			
Score according to UNESCO <sup>b</sup>	2.9	1.1	1–6
Social Support			
Social support interactions (SSL 12-I) <sup>b</sup>	25.6	4.7	12–46
Perceived Control			
Perceived control factor-score <sup>b</sup>	0.0	1.0	–2.4–2.2
No. of Chronic Medical Conditions	1.3	1.2	0–6
Cognitive Functioning			
Mini Mental State Exam (MMSE) <sup>c</sup>	27.4	2.3	19–30
No. of Months Between Baseline and Injury	23.9	16.1	0–57
Type/Severity of Fall-Related Injury (%)			
Hip fractures	20.6		
Other fractures	60.0		
Nonfractures	19.4		

<sup>a</sup>Higher scores indicate poorer function.

<sup>b</sup>Higher scores indicate higher levels of education, social support, and perceived control, respectively.

<sup>c</sup>Higher scores indicate better function.

Table 4 comprises the outcomes of the multiple regression analyses. Perceived control is a significant predictor of disability at 8 weeks post injury and becomes borderline significant at 5 months post injury ( $p = .06$ ). The significance disappears for disability at 12 months post injury. Disability at baseline is a strong predictor of disability at 8 weeks, 5 months, and 12 months post injury. The results furthermore show that younger age is significantly associated with recovery at 5 and 12 months, whereas severity of the injury is related to disability at 8 weeks only.

### DISCUSSION

The objective of this study was to examine perceived control as a predictor of the recovery of physical functions (self-reported ADL disability) of independently living older people who sustained injuries to the extremities caused by a fall. Perceived control was considered a personal resource, playing a direct or indirect role in the coping process of people who were confronted with the consequences of an accident. We presumed that patients who could rely on high levels of control would recover more of their former abilities to carry out activities of daily living than patients with low levels of control, irrespective of individual differences as to the severity of the injury, age, gender, social support, level of education, preinjury chronic medical conditions, and preinjury levels of disability. Indicators of perceived control were preinjury assessed mastery and self-efficacy

Table 3. Pearson's Correlation Coefficients of Variables in the Study ( $N = 165$ )

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Disability at baseline <sup>a</sup>	—										
2. Disability at 8 weeks post injury <sup>a</sup>	.55*	—									
3. Disability at 5 months post injury <sup>a</sup>	.73*	.69*	—								
4. Disability at 12 months post injury <sup>a</sup>	.67*	.55*	.86*	—							
5. Age	.34*	.25*	.41*	.44*	—						
6. Gender <sup>b</sup>	.01	.04	.09	.14	.08	—					
7. Number of conditions at baseline	.36*	.16*	.33*	.30*	.13	.08	—				
8. Severity of injury <sup>c</sup>	.06	-.27*	-.06	-.08	-.09	.07	.04	—			
9. Level of education <sup>d</sup>	-.17*	-.18*	-.16*	-.15	-.16*	-.18*	-.04	.04	—		
10. Social support at baseline <sup>d</sup>	-.21*	-.27*	-.26*	-.28*	-.20*	-.02	-.11	.19*	.07	—	
11. Perceived control at baseline (factor) <sup>d</sup>	-.37*	-.32*	-.40*	-.36*	-.27*	-.07	-.25*	-.06	.13	.26*	—

<sup>a</sup>Higher scores indicate poorer function.<sup>b</sup>1 = male, 2 = female.<sup>c</sup>1 = hip fracture, 2 = other fractures, 3 = nonfractures.<sup>d</sup>Higher scores indicate higher levels of education, social support, and perceived control, respectively.\* $p < .05$ .

expectations. Perceived control, as assessed before the injury, was significantly related to functioning at 8 weeks after the injury and borderline significantly related to functioning at 5 months after the injury, controlled for the selected covariates. Although perceived control was still bivariate related to disability at 12 months, the significance disappeared when the covariates were entered in the regression models. We may conclude that perceived control influences recovery after fall-related injury, although the impact is not very strong: 2% additional explained variance at 8 weeks ( $p < .05$ ) and 1% additional explained variance at 5 months ( $p = .06$ ) after the injury. The influence of perceived control on recovery becomes weaker during the year after the injury. It seems that perceived control is more salient when older persons are dealing with a challenge (the injury), but less so as the effects of injury taper off. Our results show that the impact of severity of the injury on functioning is particularly strong at 8 weeks after the injury.

Disability at baseline was a strong independent predictor of disability at 8 weeks, 5 months, and 12 months post injury. Next to the initial levels of disability, the results show that the severity of the injury is the predominant contributor to disability on the short term but that it becomes an insignificant factor over time, whereas the influence of age on recovery becomes important after 5 months. Apparently, patients' general physical reserves, which may weaken with advancing age, are conditional for the extent of the rehabilitation. The older the injured patients, the smaller their chances to recover fully from their injuries. It should also be mentioned that, on average, patients had not recaptured their preinjury levels of disability 1 year post injury. This result has also been reported in two previous articles, describing differences in recovery of physical functions between the eight respective ICPC injury groups (Scaf-Klomp et al., 2001) and the effect of social predictors on recovery (Kempen et al., 2001) in the same cohort. Although significant

Table 4. Summaries of Multiple Hierarchical Regression Models, Testing the Effect of Perceived Control on Disability ( $N = 165$ )

Variable	Disability Post Injury <sup>a</sup>											
	8 Weeks				5 Months				12 Months			
	$\beta$	$p$	$\beta$	$p$	$\beta$	$p$	$\beta$	$p$	$\beta$	$p$	$\beta$	$p$
Age	.01	.88	-.01	.88	.16	.01	.14	.01	.21	.00	.20	.00
Gender <sup>b</sup>	.05	.46	.04	.50	.07	.22	.06	.23	.12	.03	.12	.04
Level of education <sup>c</sup>	-.07	.31	-.06	.36	-.01	.88	.00	.96	.02	.79	.02	.74
Social support <sup>c</sup>	-.10	.14	-.07	.28	-.07	.19	-.05	.35	-.10	.08	-.09	.13
Number of chronic conditions	-.04	.51	-.06	.36	.07	.21	.06	.31	.06	.35	.05	.44
Disability at baseline <sup>a</sup>	.55	.00	.52	.00	.64	.00	.61	.00	.56	.00	.55	.00
Severity of injury <sup>d</sup>	-.28	.00	-.29	.00	-.07	.18	-.08	.13	-.08	.15	-.09	.12
Perceived control <sup>c</sup>			-.14	.04			-.11	.06			-.07	.24
$R^2$	.41		.43		.58		.59		.53		.54	
$F$ value	15.5	.00	14.4	.00	31.1	.00	28.1	.00	25.7	.00	22.8	.00
$R^2$ change			.02				.01				.00	
$F$ -change			4.2	.04			3.5	.06			1.4	.24

<sup>a</sup>Higher scores indicate poorer function.<sup>b</sup>1 = male, 2 = female.<sup>c</sup>Higher scores indicate higher levels of education, social support, and perceived control, respectively.<sup>d</sup>1 = hip fracture, 2 = other fractures, 3 = nonfractures.

effects of social support on recovery at 5 and 12 months after the injury were reported in the latter paper, the significant effect of social support disappears when perceived control is taken into account (present article).

Some comments have to be made regarding these results. A response rate of 63% is satisfactory for a cohort of older people who are followed for a comparatively long period (1993–1998). The unbalanced proportion of men and women in the sample does not so much refer to a bias in the sample, but rather to a gender bias in the population. Generally, compared with men, women run a greater risk of having injuries after falls or other accidents (Tinetti & Williams, 1998). Nevertheless, a certain selection concerning both the proportional distribution of injury types over the sample and the functional status of the patients cannot be ruled out. Patients with hip fractures, the most serious injury studied, are underrepresented in the sample, 20% versus 31% in the nonparticipating group. Furthermore, the non-participants were older and more disabled than the participants were. A health-related bias is a common problem in health research. Responders are generally more likely the persons with the comparatively “better” conditions among the eligible population and, consequently, the persons with the best prospects of recovery. This is all the more true if the study is longitudinal and needs the long-term cooperation of older people who suffer from the consequences of a health condition, as is the case in this study which covers a period of 6 years. However, particularly descriptive outcomes in aging studies may be affected by attrition, but attrition does not always seem to be a serious problem when associations between variables are the focus of study (Kempen & Van Sonderen, 2002). A strong point of the present study is its prospective character; preinjury data on the relevant variables are present, not only from the patients in the sample but also from the eligible persons not in the sample.

The question remains of how to evaluate the results of this study (i.e., a significant but relatively small impact of perceived control on recovery) in the light of other studies that proposed an independent contribution of perceived control over either disability or decline of functioning in older populations. One important difference between such studies and the present article is that the latter specifically deals with an abrupt and, usually, sharp decline of physical capacities. Regaining those capacities will largely be dependent on medical interventions and physical reserves, whereas personal efforts may only add to a lower extent to the rehabilitation process. Our findings that (a) disability at baseline is a strong predictor of recovery, (b) severity of injury is a predictor on the short term, whereas (c) age (which may generally represent the amount of physiological reserve) is a predictor on the longer term support this hypothesis. Other studies, showing (stronger) positive effects from perceived control over ADL functioning in older people, mainly examined effects on the gradual decline of functions, inherent to advancing age. Feeling more secure about one's capacities to perform everyday life activities may well stimulate older people to stay active, which in itself may be beneficial for delaying the negative consequences of physical decline. Furthermore, most of these studies used domain-specific constructs to indicate perceived control, for example, expecta-

tations about ADL performance or fear of falling. Although we found effects at 8 weeks and 5 months post injury, the impact of preinjury assessed perceived control on disability was not very strong. This may be due to the fact that we used (general) perceived control as a personal attribute, measuring perceptions of mastery and general self-efficacy, whereas originally self-efficacy was developed as a domain-specific concept to be used for specific intervention purposes (Bandura, 1977). However, indications for the validity of a more general definition of the concept of self-efficacy expectations are described by Sherer and colleagues (1982). Possibly, self-efficacy is a suitable construct only in relation to specific behavior in particular contexts. Another explanation for the weak association between perceived control and disability later on may be that control beliefs may change during the course of recovery. We do not have retest data on the efficacy/control measures. Beliefs held before the injury may have changed, perhaps in response to experiences surrounding the fall and healing process.

None of the studies examining the effect of perceived control on physical functioning, including our own, could explain more than a small proportion of observed differences in recovery. Apparently, in older people perceived control as a personal resource plays only a minor role in rehabilitation processes, whether this regards a sudden loss of functions caused by an accident or the negative consequences of natural physical decline. To a certain extent, intervention programs, aimed at enhancing situational feelings of control, may encourage older injured persons to do the prescribed exercises or to resume activities of everyday life that they no longer feel confident with. Further research should determine whether much direct benefit can be expected from such interventions, because until now intervention studies have been scarce and have only produced suggestions for possible success (Allegrante et al., 1991; Johnston, Gilbert, Partridge, & Collins, 1992; Mossey, Mutran, Knott, & Craik, 1989). One exception is the study of Tennstedt and colleagues (1998) who evaluated a successful intervention to reduce fear of falling and to improve physical and social function in older persons.

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